MNE2029: ELECTRICAL AND ELECTRONIC PRINCIPLES I

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Electrical and Electronic Principles I

Subject Code
MNE - Mechanical Engineering
Course Number
2029

Academic Unit
Mechanical Engineering (MNE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil
(It is desirable that students have done some courses in A-level Mathematics with knowledge of differential equations, algebra, complex numbers, etc.)

Equivalent Courses
MBE2029 Electrical and Electronic Principles I /BME2029 Electrical and Electronic Principles

Exclusive Courses
MBE2108/MNE2108 Introduction to Electromechanical Systems

Part II Course Details

Abstract

This course covers the fundamental concepts, general background and practical knowledge of electrical and electronic engineering at a level appropriate for mechanical engineering and aerospace engineering students. The course aims to present the principles of electrical and electronic engineering as well as practical applications in the aerospace environment. Furthermore, this course also aims to equip students with analysis skills of various circuits and design skills of some simple circuits, and thus enable students to develop skills in solving practical problems of electrical and electronic engineering.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand basic circuit laws, such as Ohm's law, Kirchhoff's current law, Kirchoff’ s voltage law and working principles of basic building blocks of electronic devices (diode, transistor, amplifier).		x	x	
2	Explain and solve transient/steady-state responses.			x	
3	Solve DC circuit problems by applying various analytical methods.			x	
4	Solve electronic circuit problems such as rectifier circuits, wave-shaping circuits, filter circuits and amplifier circuits.			x	x
5	Design simple filters and amplifiers.				x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts and basic knowledge.	1, 2, 3, 4, 5	3 hrs/week
2	Laboratory Work	Require students to apply learned knowledge to conduct on-hands experiment.	2, 3, 5	3 hrs/week for 3 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Midterm Test/Quiz	1, 2, 3, 4	25	
2	Laboratory Reports	2, 3, 5	25	3 reports to be submitted

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2.5

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

1. Midterm Test/Quiz

Criterion

Ability to grasp fundamental knowledge related with the electric circuit.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Laboratory Reports

Criterion

Ability to design experiment, conduct proper measurement by applying the learned knowledge to specific problems, and perform data analysis.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Examination

Criterion
Ability to understand basic concepts related with the DC and AC circuit as well as electronics.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Additional Information for AR
Note: For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Part III Other Information

Keyword Syllabus

- Electric laws and resistive circuits
- Circuit analysis (Kirchoff’ s Laws, Thevenin and Norton Theorems, Superposition Theorem)
- Inductor and capacitors
- Transients analysis
- Steady-state sinusoidal analysis and phasors
- Filters, frequency response, and resonance
- Electrical power generation and power sources
- Diodes and applications
- Bipolar junction transistors and applications
- Field effect transistors
- Operational amplifiers and applications

- Analogue and digital Signals
- Electronic systems

Reading List

Compulsory Readings

	Title
1	A.R. Hambley, Electrical Engineering, Principles and Applications, Prentice Hall, 6th Edition 2014. ISBN13: 9780133116649.

Additional Readings

	Title
1	Aircraft Electrical and Electronic Systems, Wyatt and Tooley, 2nd Edition, Routledge 2018.
2	G. Rizzoni, Principles and Applications of Electrical Engineering, McGraw Hill, 4th Edition, 2004.
3	R. C. Dorf and J. A. Svoboda, Electric Circuits, John Wiley & Sons, Inc., 5th Edition, 2001.
4	Other relevant books or literatures may be chosen by students for self-teaching, writing the lab reports and assignments.